1966 OPERATING SUMMARY

NEPEAN

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Nepean Local Advisory Committee,
Township of Nepean.

Gentlemen:

We are pleased to submit to you the 1966 Operating Summary for the Nepean Water Pollution Control Plant, OWRC Project No. 59-S-35.

It is hoped that our joint participation in efforts to combat water pollution will have even more success in the coming year.

Yours very truly,

D. S. Caverly,
General Manager.

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RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1966 Operating Summary for the Nepean Water Pollution Control Plant, OWRC Project No. 59-S-35.

The report offers a concise summary of operating data for the year and comparisons with previous years where these are applicable and significant.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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ONTARIO WATER
RESOURCES COMMISSION

FOREWORD

● This operating summary contains complete information on the management of the project during 196[illegible]. It contains a concise review of the year's plant operation, significant financial details, and a visual presentation in graphs and charts of technical performance.

The information will be of value to interested parties in assessing the adequacy of the project at this time and its ability to meet future requirements.

The report is the result of co-operation by several groups within the Division of Plant Operations. These include the statistics section and the technical publications section. The Division of Finance and the draughting section of the Division of Sanitary Engineering were also closely associated with its publication.

The Regional Operations Engineer, however, has had the primary responsibility for the content, and will be happy to answer any questions regarding it.

CONTENTS

NEPEAN

water pollution control plant

operated for

THE TOWNSHIP OF NEPEAN

by

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Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'66 REVIEW

The average daily flow to the Nepean plant in 1966 was 2.76 million gallons per day. The flows to the plant increased approximately 240,000 gallons per day from the previous year. The average daily flow of 2.76 million gallons per day is almost twice the design flow of 1.5 million gallons per day.

The operating costs for the treatment plant and the two associated pumping stations in 1966 were $33,588.90, only a slight increase from the $32,490.61 of 1965. The cost of treatment per million gallons of waste treated was $33.24.

PUMPING STATIONS

In previous years, the flows to the Shirley's Bay pumping station have exceeded its capacity of 3.5 mgd primarily during spring run-off. In 1966, the flows exceeded the pumping station capacity about July, and very frequently exceeded the capacity for the remainder of 1966. Because of the situation, a meeting was called with Township Council in the latter part of August, 1966. It was agreed that certain interim modifications would be initiated immediately, and an engineering report prepared on the total adequacy of the treatment plant.

Operating costs increased primarily due to increases in salary, increased power due to greater flows, and increased chemical costs, which are also due to the greater flows contributed to the plant. Excessive flows to the Woodroffe Avenue pumping station make the maintenance of this station very difficult. Maintenance is further hampered by the lack of bar screens, which causes numerous blockages in the pumps. The maintenance of these pumps is largely conducted during the periods of lower flow.

The No. 1 pump had a new shaft, new sleeves and new bearings installed in May. The No. 2 pump had a new shaft, new bearings and a new impeller installed. One line shaft bearing was also renewed on this pump assembly.

On January 6, 1966, the No. 3 pump was jammed because a piece of wood became lodged in the pump impeller and burned out the clutch between the motor and right-angle drive. It is felt that this condition also caused the burning out of this motor on September 14. The motor was rewound, and a bearing on the one end also installed. It is difficult to maintain a clean pumping station here since there is no clean water available for the hosing down and washing of the pumping station.

The Shirley's Bay pumping station is also difficult to maintain because of

the high flows. Even in the so-called periods of lower flows the maintenance of one pump is rather difficult because the flow exceeds the capacity of the pump, and it is necessary at times to by-pass the pumping station during these repair periods. The bar screen upstream from this pumping station is located in the open, and the rags that are collected become frozen during winter, thus making it extremely difficult to remove the material.

TREATMENT PLANT

The operation of the sewage treatment plant was hampered because of the hydraulic load. All the flow pumped to the plant from the Shirley's Bay pumping station is given primary treatment but only 1.5 mgd is treated in the secondary treatment process.

One of the activated sludge return pumps was re-sleeved and new bearings installed. The sludge re-circulating pumps from the digester were also re-sleeved, and the one pump had a new radial bearing installed. The digested sludge pump was repaired by installing new shaft bearings in July.

In January, 1966, the Wallace & Tiernan chlorinator was removed, packaged and sent to the Wallace & Tiernan repair shop in Toronto for complete overhauling. This was the first repair work on this unit since the plant started operation in 1961.

Two flights on the primary sludge collectors were broken in 1966 and had to be replaced. Both of the chain tightners of the primary cross collectors were lowered, and a new chain drive and two drive sprockets were installed on the primary cross collectors.

One drive ring from the Ames-Crosta Mills mechanical aerators was replaced in 1966. The operation of these units was cumbersome during the winter months when ice formed on the bridge above the aeration drive ring. To alleviate this condition to some extent, the level in the aeration tanks is carried somewhat lower during the cold winter months than would otherwise be done during the rest of the year.

There were no sludge disposal costs incurred at the plant in 1966 because of the sludge lagoons that are situated behind the plant site. It is conceivable that costs may be incurred in 1967 due to the fact that these sludge lagoons are rather full.

The average BOD and suspended solids in the plant influent in 1966 was 49 ppm and 88 ppm respectively. The plant effluent BOD and suspended solids in 1966 were 28 ppm and 48 ppm respectively. The percent reduction of BOD was 43 percent and the percent reduction of the suspended solids was 45.5 percent. The concentration of the BOD and suspended solids in the effluent is greater than the OWRC objectives. However, these could not be obtained due to the hydraulic loading. The suspended solids in the effluent were high, possibly also due to the fact that a large portion of the waste is given only primary treatment.

Inspections conducted by head office engineers and technicians in 1966 revealed that the plant maintenance and cleanliness were satisfactory.

PROJECT COSTS

59-S-35

NET CAPITAL COST (Final)	$1,444,574.46
DEDUCT - Payments from Municipalities	670,000.00
Long Term Debt to OWRC	$ 774,574.46
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1966	$ 86,800.14
Net Operating	$ 33,588.90
Debt Retirement	15,631.00
Reserve	9,098.59
Interest Charged	43,579.32
TOTAL	$ 101,897.81

RESERVE ACCOUNT

Balance at January 1, 1966	$ 28,776.78
Deposited by Municipality	9,098.59
Interest Earned	1,378.74
	$ 39,254.11
Less Expenditures	10,975.10
Balance at December 31, 1966	$ 28,279.01

NET CAPITAL COST (Final) Long Term Debt to OWRC	$160,984.91
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1966	$ 18,605.83
Net Operating	$ 1.00
Debt Retirement	3,249.00
Reserve	852.61
Interest Charged	9,057.41
TOTAL	$ 13,160.02

RESERVE ACCOUNT

Balance at January 1, 1966	$ 4,563.33
Deposited by Municipality	852.61
Interest Earned	271.06
Less Expenditures	-
Balance at December 31, 1966	$ 5,687.00

MONTHLY OPERATING COSTS

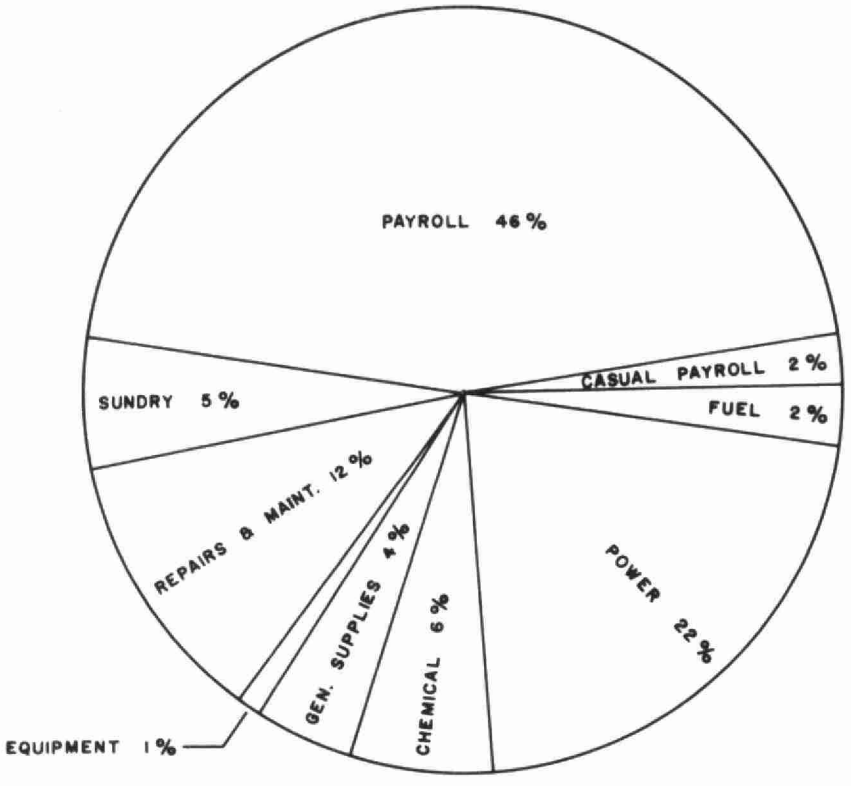
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	1925.73	1097.66					145.79		40.73	641.55
FEB	1874.39	1072.30			673.79		47.32		56.20	24.78
MARCH	2912.57	1109.51			564.26	385.00	187.33	77.25	498.33	90.89
APRIL	3170.69	1662.87		101.32	629.66		146.87	118.41	396.49	115.07
MAY	2909.99	1333.74		114.00	621.47	274.05	81.78	59.10	285.42	140.43
JUNE	3480.55	1255.07	121.60		600.65	465.00	180.58	10.12	793.63	53.90
JULY	2273.39	1131.31	232.48		660.40		64.78		164.26	20.16
AUG	3242.68	1226.61	243.48		575.64	448.50	86.22		642.07	20.16
SEPT	3210.96	1778.74	140.80		644.38	456.75	117.83		52.30	20.16
OCT	2698.85	1185.94		128.43	567.90				392.49	424.09
NOV	2699.45	1184.33		228.00	556.00		154.18	102.57	453.39	20.18
DEC	3189.65	1184.33		246.58	1234.17		230.38		124.57	169.62
TOTAL	33588.90	15222.41	738.36	818.33	7329.12	2029.30	1443.06	367.45	3899.88	1740.99

YEARLY OPERATING COSTS

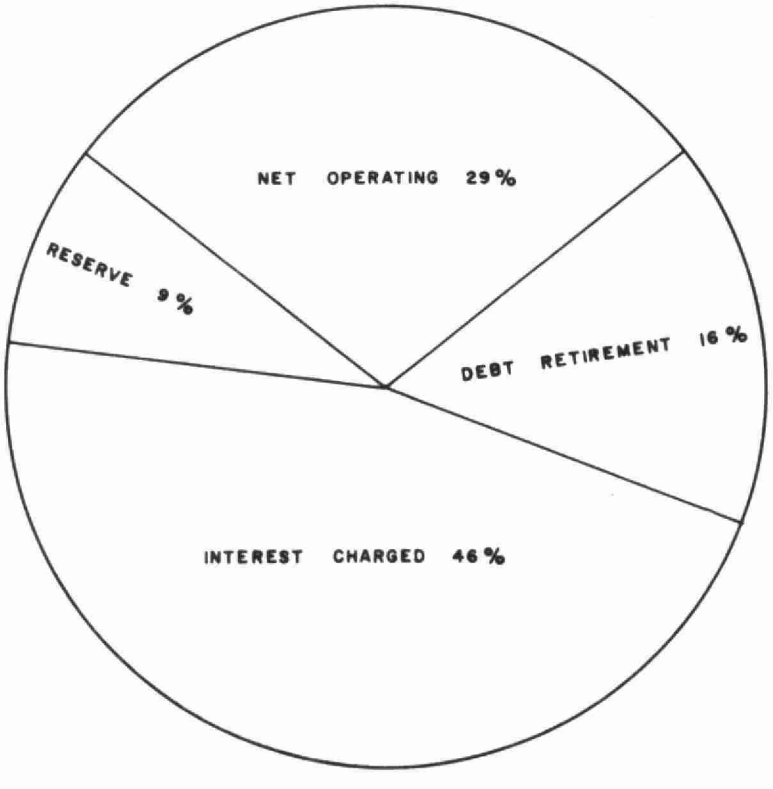
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	660.0*	$31128.25	$47.18	7 CENTS
1963	678.8	$31925.64	$47.08	14 CENTS
1964	726.4	$31159.12	$42.89	7 CENTS
1965	836.1	$32490.61	$36.67	9 CENTS
1966	1010.5	$33588.90	$33.24	16 CENTS

* PRORATED ON SIX MONTHS' DATA

1966 OPERATING COSTS



TOTAL ANNUAL COST



Process Data

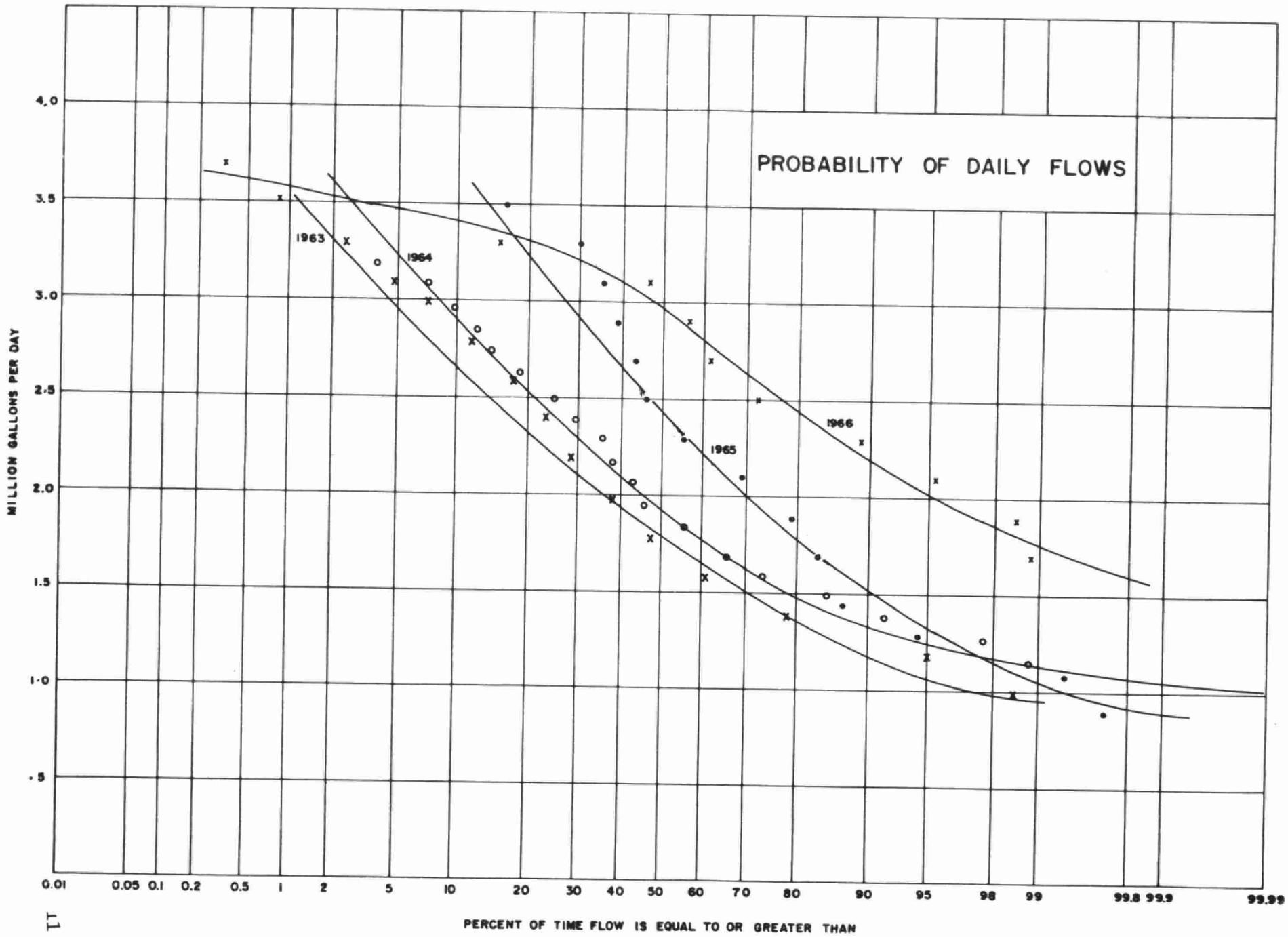
PLOT OF PROBABILITY OF FLOWS

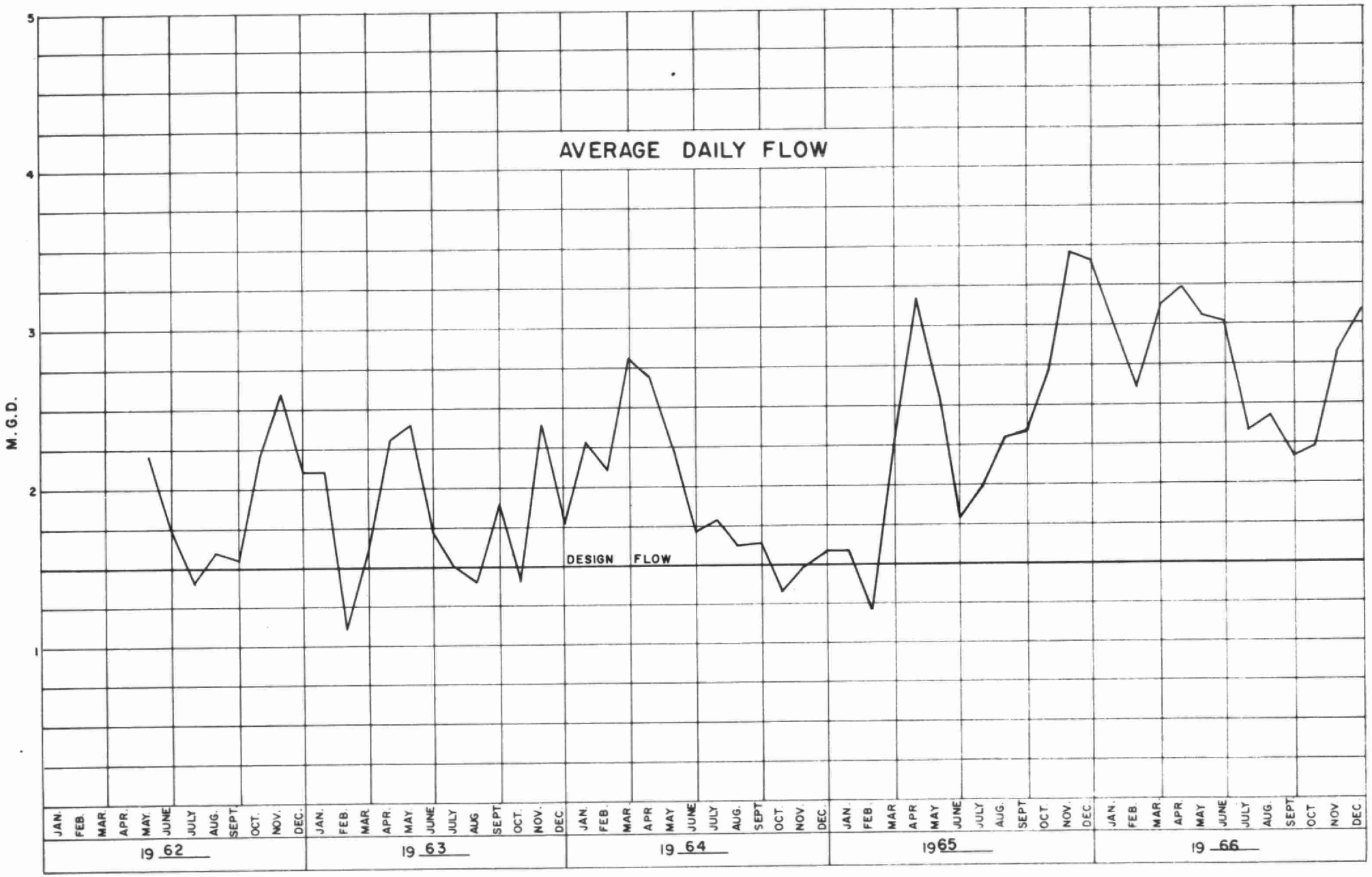
An examination of the probability of flows graph reveals that the 1966 curve levels off at the 3.5 mgd figure. This is due to the capacity of the Shirley's Bay pumping station, which is approximately 3.5 mgd. It should further be noted that 50 percent of the time the flows to the plant exceeded 3 mgd. The 1966 curve does not reach down to the design plant flow of 1.5 mgd.

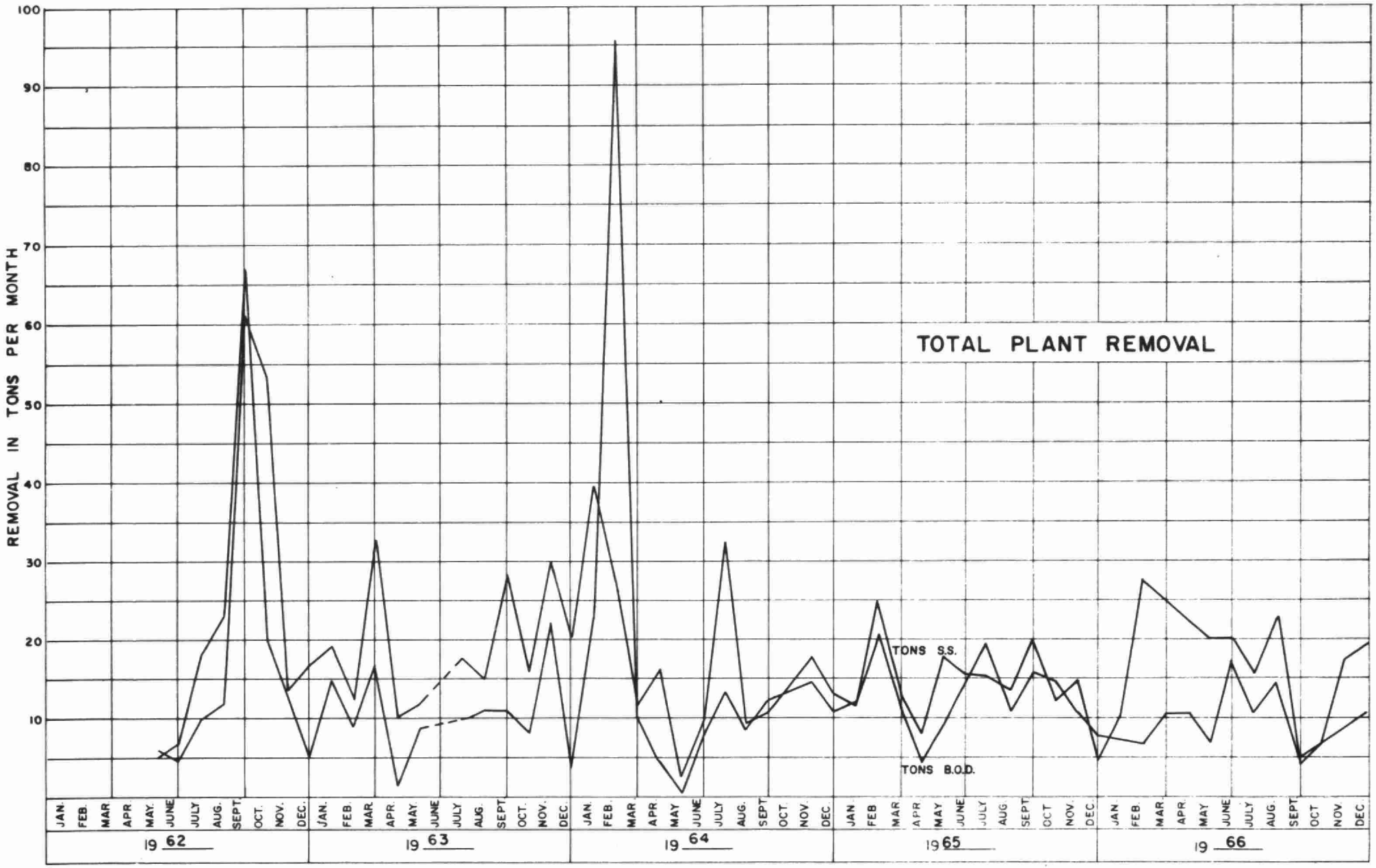
1966 DAILY FLOW GRAPH

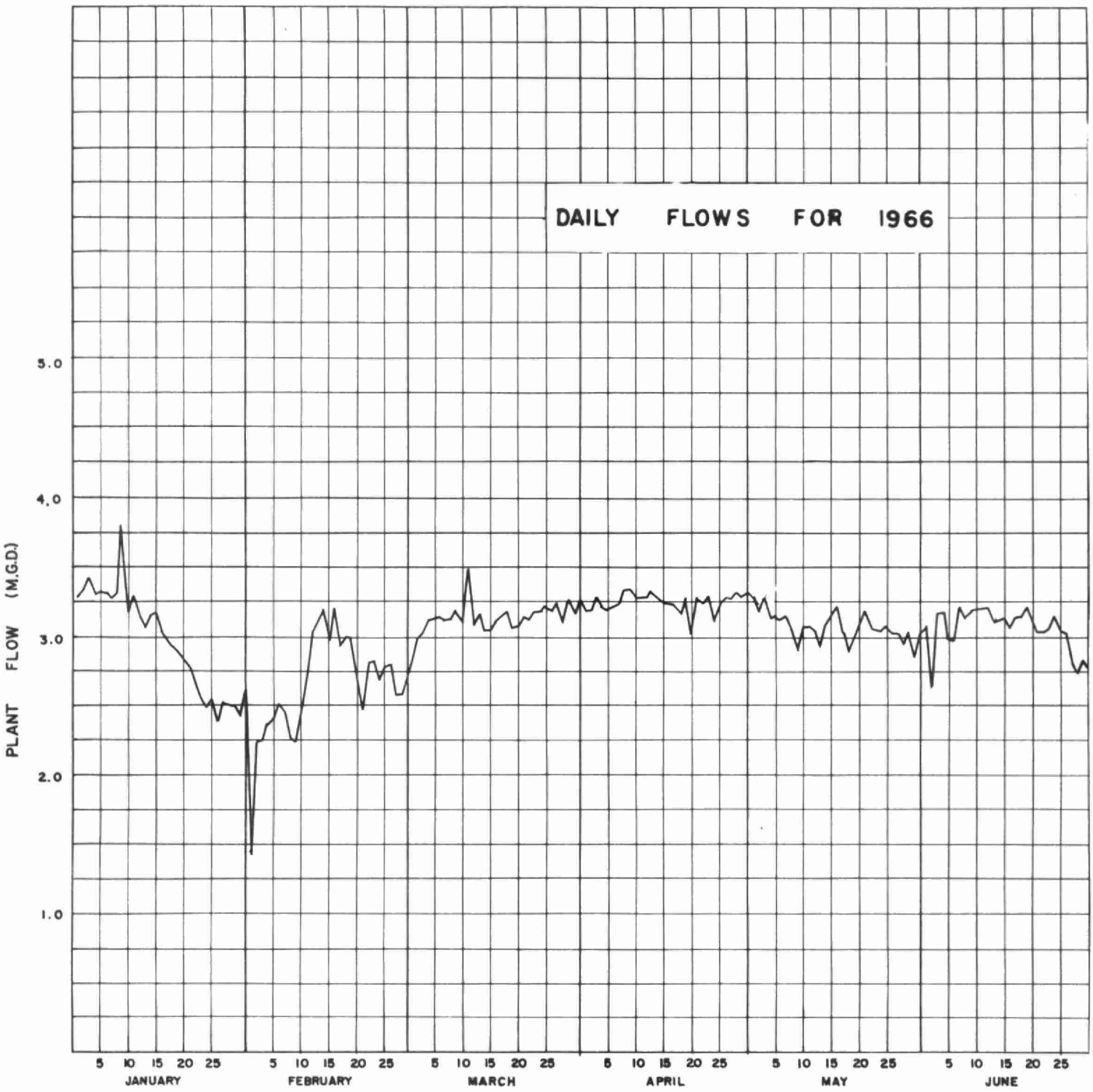
The 1966 daily flow graph showed the flows to be approximately 3 mgd from the middle of February to the end of June. From the beginning of July to the end of October, the flows diminished somewhat, and probably averaged about 2.25 mgd. During the beginning of November the flows again increased above 3 mgd and remained there for the rest of the year.

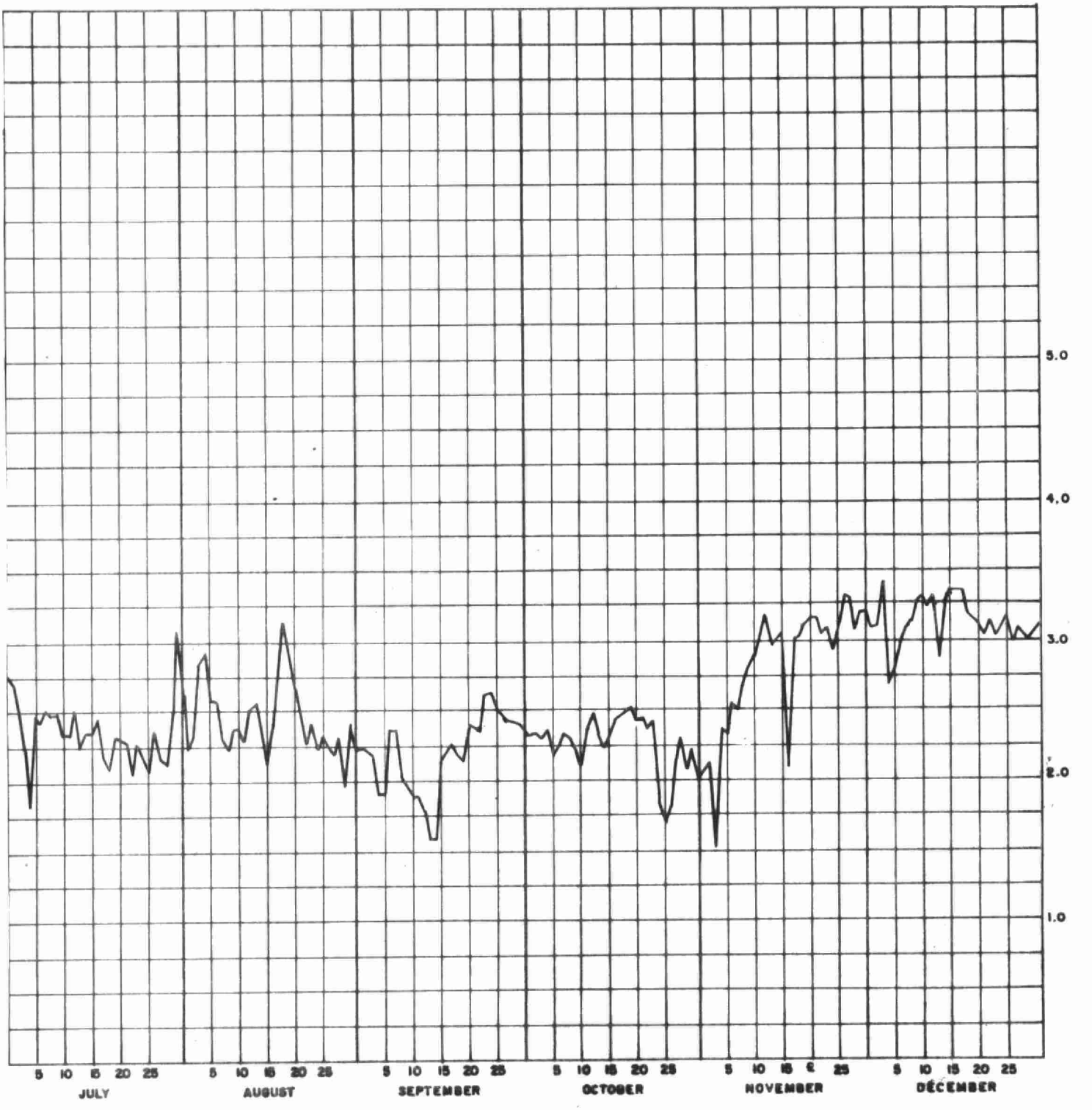
The total flows directed to the treatment plant are not available since flows exceeding the 3.5 mgd capacity of the Shirley's Bay pumping station are automatically by-passed. It was, however observed that by-passing of the Shirley's Bay pumping station was very frequent in the year 1966.

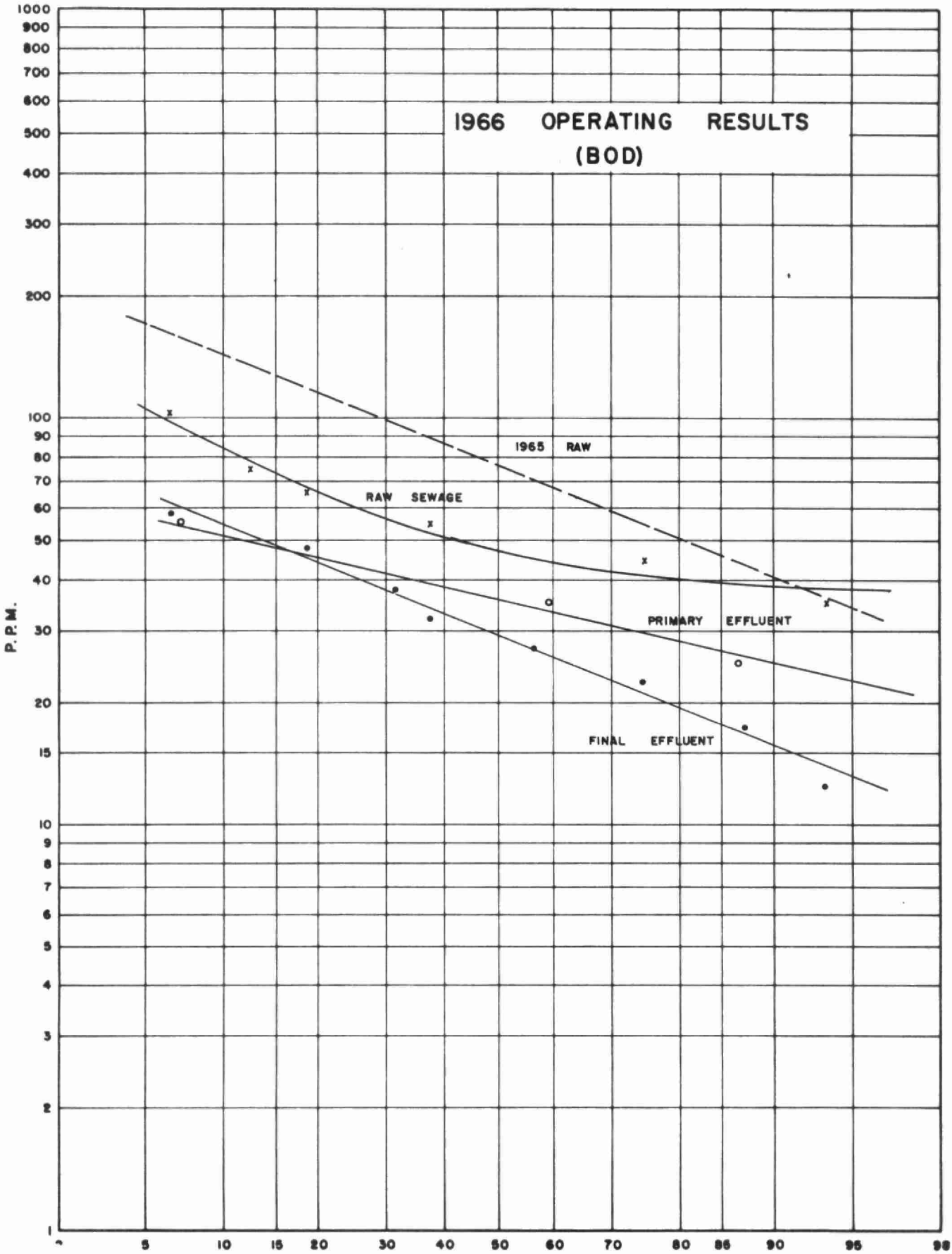

PROBABILITY OF DAILY FLOWS
1963
1964
1965
1966
MILLION GALLONS PER DAY
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT OF TIME FLOW IS EQUAL TO OR GREATER THAN

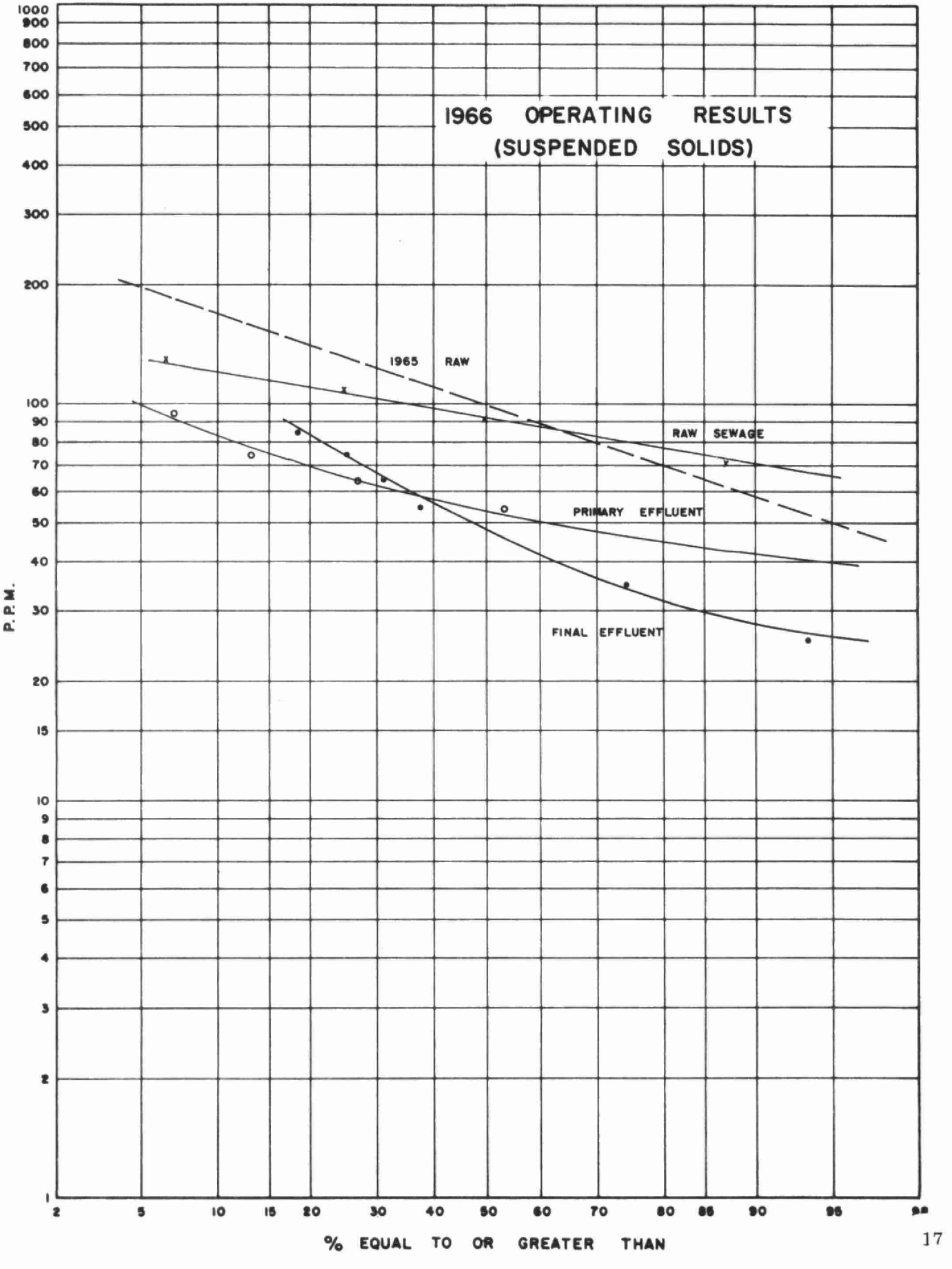

AVERAGE DAILY FLOW
M.G.D.
5
4
3
2
1
DESIGN FLOW
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 62
JAN. FEB. MAR. APR. MAY JUNE JULY AUG SEPT OCT. NOV. DEC.
19 63
JAN. FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV DEC.
19 64
JAN. FEB. MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1965
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT NOV DEC.
19 66

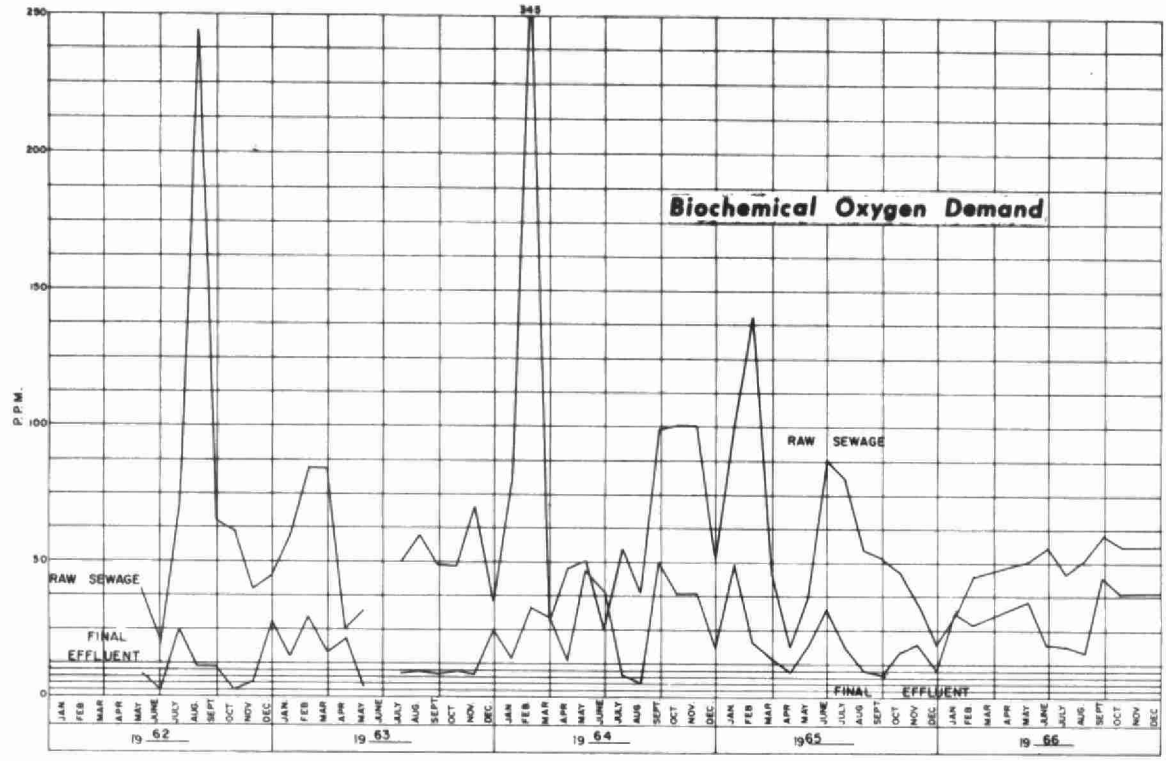

TOTAL PLANT REMOVAL
REMOVAL IN TONS PER MONTH
100
90
80
70
60
50
40
30
20
10
TONS S.S.
TONS B.O.D.
JAN. FEB. MAR APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 62
19 63
19 64
19 65
19 66


DAILY FLOWS FOR 1966
PLANT FLOW (M.G.D.)
5.0
4.0
3.0
2.0
1.0
5 10 15 20 25
JANUARY
5 10 15 20 25
FEBRUARY
5 10 15 20 25
MARCH
5 10 15 20 25
APRIL
5 10 15 20 25
MAY
5 10 15 20 25
JUNE

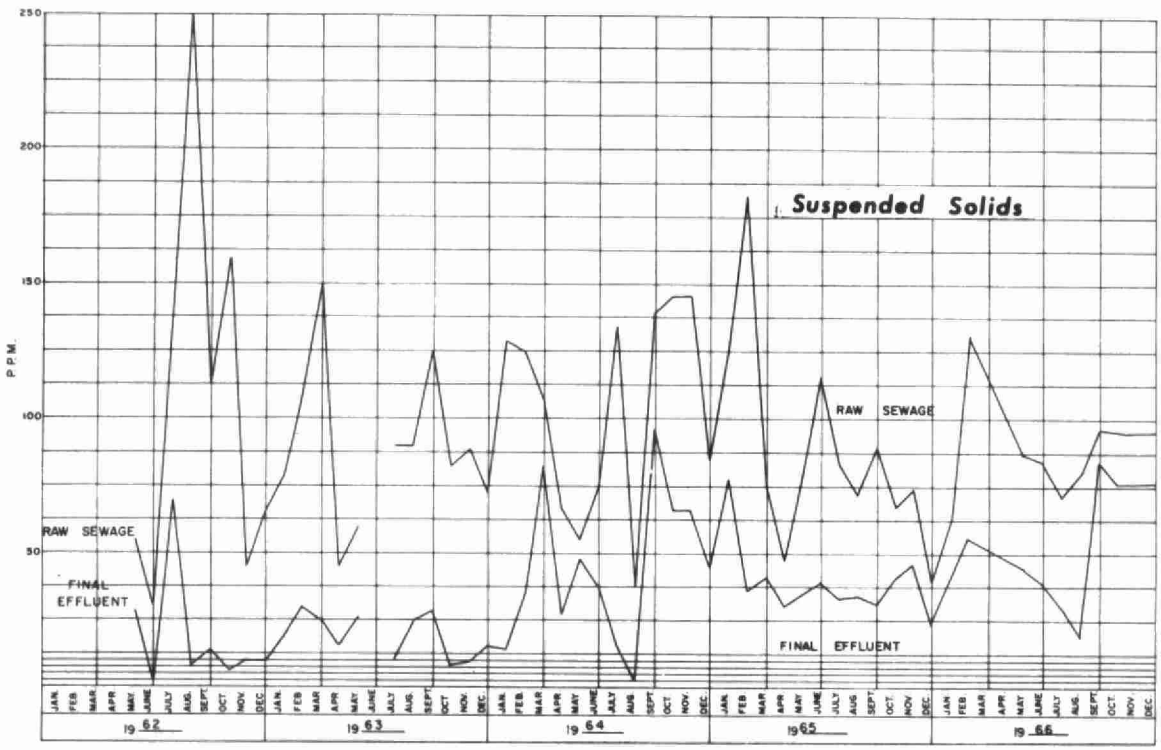

5.0
4.0
3.0
2.0
1.0
5 10 15 20 25
JULY
5 10 15 20 25
AUGUST
5 10 15 20 25
SEPTEMBER
5 10 15 20 25
OCTOBER
5 10 15 20 25
NOVEMBER
5 10 15 20 25
DÉCEMBER


1966 OPERATING RESULTS
(BOD)
1965 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
5
10
15
20
30
40
50
60
70
80
85
90
95
98


1966 OPERATING RESULTS
(SUSPENDED SOLIDS)
1965 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.			
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED
JAN.	30	31	0.0	0.0	62	40	35.5	10.1
FEB.	45	27	40.0	6.6	131	56	57.0	27.6
MAR.	* 49	28	43.0	10.1	* 88	48	45.5	19.3
APR.	* 49	28	43.0	10.2	* 88	48	45.5	19.4
MAY	50	36	28.0	6.6	86	44	49.0	20.0
JUNE	56	19	66.0	16.9	82	38	53.5	20.1
JULY	46	18	61.0	10.1	72	30	58.5	15.2
AUG.	51	13	74.5	14.3	79	19	76.0	22.6
SEPT.	59	44	25.5	4.9	97	84	13.5	4.3
OCT.	56	38	32.0	6.3	95	76	20.0	6.6
NOV.	* 49	28	43.0	8.9	* 88	48	45.5	17.0
DEC.	* 49	28	43.0	10.2	* 88	48	45.5	19.4
TOTAL	-	-	-	106.1	-	-	-	202.1
AVG.	49	28	43.0	8.8	88	48	45.5	16.8

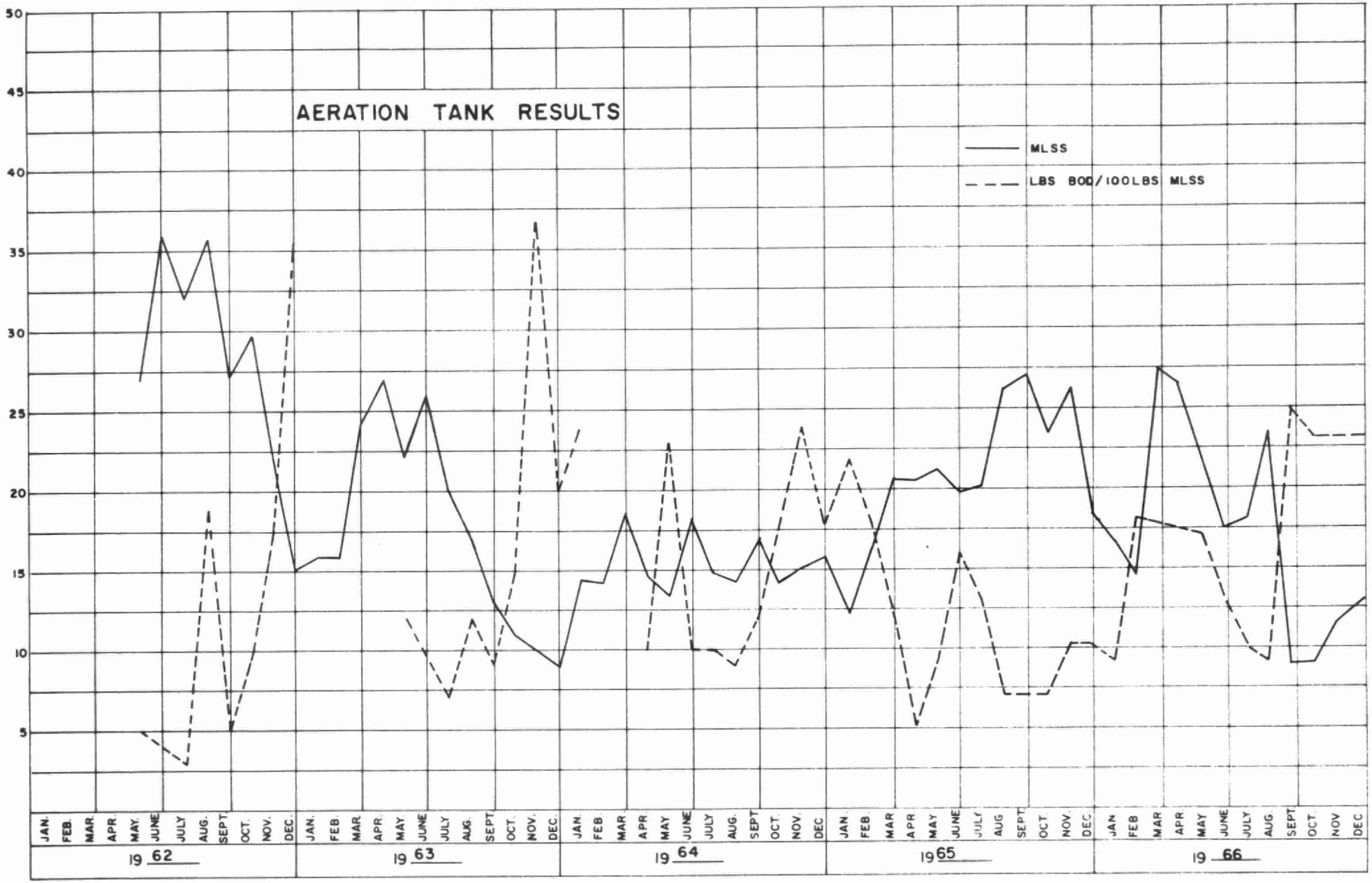
* Average values substituted. No sample.

COMMENTS

The average strengths of the BOD and suspended solids that were received at the plant in 1966 were 49 ppm and 88 ppm respectively. The strengths of the plant BOD and suspended solids in 1966 were 28 ppm and 48 ppm respectively. The percent removal of BOD and suspended solids was 43 and 45.5 respectively. This reduction is rather low for a secondary treatment plant. However, it should be noted that the hydraulic flows to the plant were in excess of plant capacity. The laboratory analyses are based on eight eight-hour composite samples that were obtained at the plant and submitted to the OWRC Laboratory for analyses.

The total quantity of BOD removed from the waste in 1966 was 106 tons. The total quantity of suspended solids removed from the waste in 1966 was 202 tons. This quantity of material would have been discharged into the Ottawa River had it not been treated at the Township of Nepean WPCP.

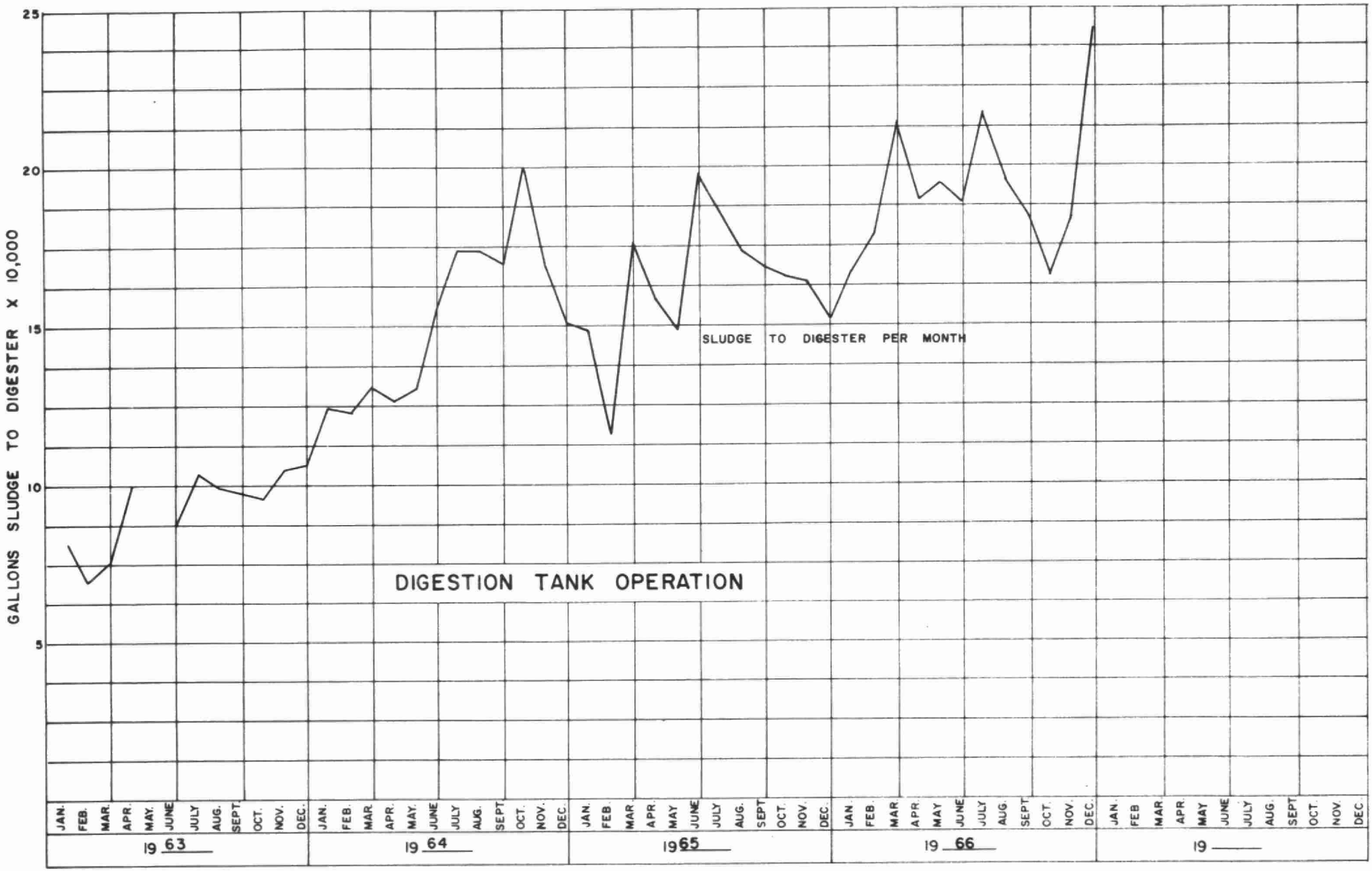
Concentration of BOD and suspended solids in the effluent exceeded the OWRC objectives. However, this was due primarily to the hydraulic overloading of the plant.


AERATION TANK RESULTS
MLSS
LBS BOD/100LBS MLSS
50
45
40
35
30
25
20
15
10
5
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 62
19 63
19 64
19 65
19 66

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. BOD. PER 100 LBS. M. L. S. S.
JANUARY	20	1679	9
FEBRUARY	39	1426	18
MARCH	-	2735	-
APRIL	-	2685	-
MAY	46	2132	17
JUNE	30	1747	13
JULY	30	1784	10
AUGUST	35	2346	9
SEPTEMBER	40	871	25
OCTOBER	36	885	23
NOVEMBER	-	1149	-
DECEMBER	-	1252	-
TOTAL	-	-	-
AVERAGE	34	1724	16

COMMENTS

The average loading of the aeration section of 16 lbs. of BOD per 100 lbs. of mixed liquor suspended solids is rather low. This could be attributed to the rather dilute waste reaching the plant, and was possibly also due to the sampling program, which is conducted primarily during the daytime hours. It is known, however, that the real waste load from the area is received at the plant at approximately 12 noon and extends to approximately 12 midnight.


GALLONS SLUDGE TO DIGESTER X 10,000
25
20
15
10
5
SLUDGE TO DIGESTER PER MONTH
DIGESTION TANK OPERATION
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 63
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 64
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JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 66
JAN. FEB MAR APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 ____

DIGESTER OPERATION

Month	Sludge to Digesters (1000s Cu. Ft.)	Sludge from Digesters (1000s Cu. Ft.)	Gas Produced (1000s Cu. Ft.)
January	26.83	-	-
February	28.72	-	-
March	34.25	-	-
April	30.29	6.97	-
May	31.30	12.26	-
June	30.29	10.50	-
July	34.68	8.08	-
August	31.30	7.93	-
September	29.50	7.93	-
October	26.54	7.93	* 350.57
November	29.68	20.67	771.53
December	39.31	4.81	971.23
Total	372.69	87.08	-
Average	31.06	7.26	-

* 12 days data. Meter returned to service.

COMMENTS

The total quantity of 372,690 gallons of raw sludge was pumped to the digesters from the primary sedimentation tanks in 1966. The total quantity of digested sludge that was pumped to the sludge drying lagoons was 87,000 cubic feet. This is a reduction in volume of approximately 72 percent.

The gas production from the sludge that was removed from the waste was approximately 850,000 cubic feet per month. This gas was utilized to heat the sludge and buildings, and therefore saved costs in the purchase of fuel oil. Gas production figures for the first nine months of the year are not available since the gas meter was not put into operation until October.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	91.831	-	-
FEBRUARY	73.752	-	-
MARCH	96.502	-	-
APRIL	97.234	-	-
MAY	95.111	* 1350	3.14
JUNE	91.218	2641	2.90
JULY	72.464	1802	2.49
AUGUST	75.374	1622	2.15
SEPTEMBER	65.597	1958	2.98
OCTOBER	69.563	* 1416	2.74
NOVEMBER	84.976	-	-
DECEMBER	96.840	-	-
TOTAL	1010.462	10789	-
AVERAGE	84.205	1798	2.70

* 14 days' chlorination
** 23 days' chlorination

COMMENTS

Chlorination was practised at the Township of Nepean WPCP from May 15 to October 23. A dosage of 2.70 ppm of chlorine was required to obtain a chlorine residual of 0.5 ppm after a retention period of 15 minutes. This was done to disinfect the plant effluent.

LABORATORY LIBRARY
9693600019386

RECOMMENDATIONS

Recommendations proposed in the 1965 Annual Report are all presently being initiated. Further efforts should be maintained to minimize the amount of ground and surface water gaining access into the sanitary sewer system.


ONTARIO WATER RESOURCES COMMISSION